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## Assuring the Future—How We Gained Access to Additional Radio Spectrum for Flight Testing

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*In the mid-1980s, spectrum used by the Department of Defense (DoD) test community began to be reallocated for the rapidly growing consumer electronics market. By the mid-1990s, the DoD had lost access to 30 percent of the spectrum used to carry data during testing of aerospace vehicles. At the same time, advances in computer technology and onboard sensor electronics resulted in an exponentially increasing demand for additional spectrum to provide useful test results in real time during test events. The DoD joined with the National Aeronautics and Space Administration (NASA) and the aircraft manufacturers' industry group, the Aerospace and Flight Test Radio Coordinating Council (AFTRCC), to address this shared problem. Operating as the ad hoc Range Spectrum Requirements Working Group (RSRWG), the three partners developed a plan that ultimately led them to the International Telecommunications Union (ITU), an international treaty organization based in Geneva, Switzerland. This challenge required the three partners to use nontraditional approaches to address this issue. This article discusses the working relationships and approaches used to ensure that we successfully addressed the issues of spectrum encroachment.*

The Range Spectrum Requirements Working Group (RSRWG) planning process began in 1996 with the development of a three-pronged approach: (a) defend against further losses of spectrum; (b) develop new technologies to more effectively use the spectrum; and (c) devise new approaches and processes, including gaining access to additional spectrum. While most of the plan called for straightforward use of internal Department of Defense (DoD) and interagency processes in Washington, gaining access to additional spectrum presented unique challenges for the test community. This feat would require buy-in of the senior leadership in each of the organizations represented, both government and private industry. The RSRWG spearheaded the effort to implement this plan, which involved foreign governments and ultimately resulted in the consortium's participation in the International Telecommunications Union's (ITU's) international radio frequency spectrum regulatory arm, the World Radiocommunication Conference (WRC). Changes in radio frequency (RF) allocations are tantamount to revisions to an international treaty.

The RSRWG plan called for a globally harmonized RF band or set of bands to allow interoperability of test assets, reduced equipment cost through commonality, global testing, and increased protection against RF spectrum encroachment. The National Aeronautics and Space Administration (NASA) had earlier submitted a proposal to the ITU to consider "spectrum for wideband telemetry in the 3 to 30 Gigahertz (GHz) region" at some future WRC. Such undertakings invoke all the machinery of state, and the process takes years. The RSRWG partners began by giving as many educational briefings on the requirement for additional spectrum as needed to all of the stakeholders in spectrum management to include the Department of Commerce, the Department of State, and the Federal Communications Commission. Furthermore, the NASA and DoD

representatives were responsible for communicating the new requirements to their respective spectrum management offices. For the DoD, that required getting approval from the Director of Spectrum Policy within the Office of the Assistant Secretary of Defense (ASD) for Command, Control Communications, and Intelligence (C3I) (now ASD for Networks and Information



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Integration or NII) and the spectrum management agencies of the military services.

### The road to WRC-2007

The road to WRC is a very long process. The first step is developing a case to justify placing a proposal on the agenda for a future WRC. A proposal first goes to a WRC as a recommendation that it be placed on the agenda for consideration at the following WRC. Typically the WRC convenes every three to four years, and changes are agreed to only if a consensus is reached among the 191 member nations. Therefore, it was necessary to ensure that a sufficient number of nations would support the U.S. telemetry agenda item to ensure consensus. Accordingly, the RSRWG had to develop a plan that allowed it to educate foreign nations. The RSRWG, while representing a powerful U.S.-based coalition, needed to become an international force. As a result, the group teamed with the International Foundation for Telemetry (IFT) to work together to garner the international support necessary to make the essential additional spectrum allocations a reality. Together, the RSRWG and the IFT worked to charter the International Consortium for Telemetry Spectrum (ICTS). The ICTS membership encompasses representatives from most major aircraft manufacturers and military and flight test establishments throughout the world. The goal of the ICTS was to facilitate the development of a set of internationally agreed-upon technical recommendations and implementation alternatives. The sharing of information within the ICTS provided the foundation for the ICTS members to convince their national spectrum managers that the telemetry spectrum proposal for WRC was important to their nation's interest. As a result of RSRWG and ICTS efforts, the United States succeeded in getting the telemetry spectrum proposal approved at WRC-2003 as Agenda Item 1.5 for WRC-2007.

A grassroots effort was required to communicate the details of Agenda Item 1.5 directly to as many member nations as possible prior to the WRC. This was accomplished by informational briefings at regional level forums. The ITU has divided the world into three regions. Groups of nations within these regions have formed regional organizations. These regional organizations have official standing within the ITU and submit a single consolidated set of positions for their respective organizations. Building support within these regional organizations was one of the keys to success at WRC-2007.

RSRWG members knew that even with extensive grassroots efforts, more work was required to ensure the success of Agenda Item 1.5. Approximately 3,000 delegates from more than 150 countries attend the WRC. Many of these delegates arrive with little knowledge about the agenda items of other delegates.

To secure the highest probability of success for Agenda Item 1.5, the ICTS developed an information booth to educate delegates on the initiative.

Because ITU is an international treaty organization, each country's delegation at WRC is led by an ambassador. Another key aspect of the RSRWG's outreach efforts was to brief the leader of the U.S. delegation. A few weeks before the WRC, representatives of the U.S. DoD test ranges led by the TRMC, along with representatives of the commercial aircraft manufacturers, met with the U.S. WRC Ambassador in Washington, D.C., to brief him on WRC Agenda Item 1.5. The Ambassador immediately grasped the significance of the item and remained an effective advocate throughout the duration of the WRC.

### WRC-2007—October 22 to November 16, 2007

The years of preparation by the RSRWG partners came to fruition in the four-week period beginning on October 22, 2007, in Geneva. Three representatives of the partnership were members of the U.S. delegation. ICTS colleagues from Germany and France were members of their respective nation's delegations.

Agenda Item 1.5 took 23 of the 26 days of WRC-2007 to make it through the process. In the end, the international telemetering community gained access to substantial amounts of additional bandwidth, including the first globally harmonized band. The band of 5091–5150 MHz is now authorized for aeronautical telemetry in every country in the world. Many regions of the world have access to substantially more bandwidth in addition to the global band. The United States and Canada have the ability to access up to 1.4 GHz of additional spectrum for telemetering applications. Although this may seem like an overly generous amount, a majority of this spectrum is already in use by incumbent users. However, the RF bands approved by the WRC will provide all users with greater flexibility to work within these allocations together with minimal impact on each other.

The success of WRC-2007 Agenda Item 1.5 is clearly due to the strong partnership that led to effective channels of communications and the willingness of senior leadership across government and industry to make a long-term commitment to pursuing a common goal. The 10-year quest for telemetry spectrum ended in a resounding success. □

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